COMPREHENSIVE STUDY REGARDING THE ORAL HEALTH OF SPECIAL OLYMPICS ATHLETES IN THE ERASMUS + O.S.C.A.R. PROJECT COUNTRIES – FRANCE, ITALY, ROMANIA, TURKEY

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ABSTRACT

The aim of this study is to get a comparative picture of oral health of Special Olympics (SO) athletes in the 4 countries involved in Erasmus+ project 2019-1-RO01-KA202-063820 Oral Special Care Academic Resources (OSCAR): France (FR), Italy (IT), Romania (RO) and Turkey (TR). **Material and methods.** A comprehensive literature search of recently published (Jan 2010-Nov 2021) data on the oral health of SO Special Smiles (SS) athletes from RO, TR, FR, IT was conducted during December 2021 according to PRISMA guidelines. PubMed electronic database was searched for full-text articles in English. From the initial 101 studies, 5 were selected. **Results.** Gingivitis was reported in 49.52% of FR, 60.60 to 62.2% of IT, 66.29% of TR and 70.41 to 79% of RO SO athletes. Sealants were found in 4.5% of RO and 9.4% of IT. Detailed oral health data were only available for SO RO athletes, whose treatment needs were met up to 25%; 2 out of 3 RO SO athletes had less than 10% of the needed treatment done. **Conclusions.** SO athletes from the four analysed countries still have a lot of unmet dental treatment needs and few sealed permanent teeth. Romanian SO athletes have poorer oral health status as compared to peers from Italy, France, and Turkey. An upgrade of the standard Special Smiles screening protocol could enable more reliable comparisons between SO athletes from various countries. Targeted preventive programs and educational projects for patients, families and dentists are needed in order to improve oral health of people with intellectual disabilities.

Key words: Intellectual disabilities; Oral health; Special Olympics, OSCAR

INTRODUCTION

Patients with special health care needs (SHCN) may have many types of pathologies of different origins (e.g.: congenital, physical, toxic, infectious or determined by drugs or diet interactions during pregnancy) that may cause sensory, speech or movement disorders [1]. More than 1 billion persons with different types of disabilities live around the world, making them the world's largest minority (15% of the entire population). 5.1% of them (about 95 million) are children (with the age range between 0-14 years-old), from which 0.7% (about 13 million) have "severe disability" [2].

Regarding oral health issues, people with SHCN have a poor oral hygiene, more periodontal problems, a higher rate of untreated caries, fewer restorations, less prosthetic rehabilitations, and a higher number of extracted teeth (especially first permanent molars), as compared to clinically healthy patients [3-5]. Abnormal tooth eruption, abnormal tooth development and changes in masticatory and occlusion function may also occur in patients with intellectual disabilities (ID) [6]. Poor oral health can have an impact on the general health status, which may lead to chronic diseases such as diabetes, respiratory diseases, cardiovascular disorders, and stroke. Oral health can also have an influence on individual's social and psychological health [7].

Both general and oral health problems may have a negative impact on SHCN patients' wellbeing, influencing their quality of life (QoL). The World Health Organization (WHO) defines QoL as "individual's perception of his/her position in life in the context of the culture and value systems in which they live and in relation to his goals, expectations, standards and concerns" [8].

Poor oral health, aggravated by limited access to dental care and low oral health literacy affects the psychological and social wellbeing of the patient, and QoL respectively, because of: (1) the tendency of the patient with visible oral problems to avoid social contact; (2) persistent pain that has depressing effects; (3) dental diseases that may affect verbal and non–verbal communication and the way a patient looks and sounds; (4) the fact that oral problems are likely to damage self–image and alter the ability to sustain and build social relationships [1,9].

Due to their fragile general health, SHCN patients are dependent on others (family or caregivers) to perform daily basic activities, and therefore have a limited participation in society and a higher poverty rate [10]. Because of SHCN children's mobility impairments and necessity for assistance in performing or receiving oral hygiene, their families have greater needs as compared to healthy patients families [1].

Given the fact that general health and QoL are both influenced by the oral health status, oral treatments for SHCN patients should be provided in the early phases of the disease, in order to simplify the procedures and make them easily accepted [11].

SHCN patients often have limited access to oral care, due to a number of barriers: (1) physical barriers - absence of environment adaptations, that limit or prevent people with physical disabilities from obtaining services at the dental office/hospital (uneven access to buildings, inaccessible medical equipment, narrow doorways, internal steps, inadequate bathroom facilities and inaccessible parking areas); (2) psychological barriers – limited communication abilities for both dentists and patients; (3) professional barriers – few to no dedicated facilities and few trained specialists [9,12,13].

Special Olympics International (SOI) is a foundation aiming to promote social integration of people with intellectual disabilities through sports. Starting in 1996 SOI developed a health initiative "Healthy Athletes" (HA) aiming to improve general health of SO athletes. The oral health branch

of HA is "Special Smiles" (SS) that started in 1997 and consisting of oral screenings of athletes during SO sports competitions under field conditions, using disposable dental mirrors and probes, following the Special Olympics Special Smiles (SOSS) standardized screening protocol [14]. Adapted oral hygiene demonstrations for SO athletes are also part of the SS agenda.

Aims

Given the above information, the aim of our study is to get a comparative picture of oral health of SO athletes in the 4 countries - France (FR), Italy (IT), Romania (RO) and Turkey (TR) - involved in Erasmus+ project 2019-1-RO01-KA202-063820 Oral Special Care Academic Resources (OSCAR).

MATERIAL AND METHODS

Literature Search

A comprehensive literature search of recently published data on the oral health of SO athletes from RO, TR, FR, IT was conducted during December 2021 according to PRISMA guidelines [15]. PubMed electronic database was searched using the following keywords ["Romania" AND "oral health" AND "Special Olympics"] OR ["Romania" AND "oral health" AND " disability"] OR ["Italy" AND "oral health" AND "Special Olympics"] OR ["Italy" AND "oral health" AND "disability"] OR ["France" AND "oral health" AND "Special Olympics"] OR ["France" AND "oral health" AND " disability"] OR ["Turkey" AND "oral health" AND "Special Olympics"] OR ["Turkey" AND "oral health" AND " disability"]. The timeframe for publication date was set from January 2010 until November 2021. PubMed electronic database was searched.

Study selection and data extraction

The following criteria were taken into consideration for inclusion:

1) study population was represented by SO athletes from RO, IT, FR, TR; 2) article contained data on oral health status. From each study, the searched and collected data (where available) were: number of participants, demographic data (age, gender), DMF-T index (D=decayed, M=missing, F=filled), percentage of caries-free subjects, percentage of subjects with sealed teeth and signs of gingival disease, restorative index RI= [F/(D+F)]x100%, plaque index (PI, Silness-Löe) and percentage of persons with at least 1 extracted permanent molar.

The present review was conducted using a PRISMA outline (Fig. 1). A total of 101 records were found by search of the electronic database. 8 duplicates were removed manually before screening. We did not use any automation tools to exclude articles. The titles and abstracts of 93 records were screened after duplicates removal and 62 were excluded because they were not relevant with the present research. Thirty-one reports were retrieved and assessed for eligibility as full texts and 26 of them were excluded for one of the following reasons: (a) only abstract, not full article; (b) contained no data about oral health status; (c) the articles were not about SO athletes from RO/IT/FR/TR. A total of 5 reports were screened and all of them were included in this review.

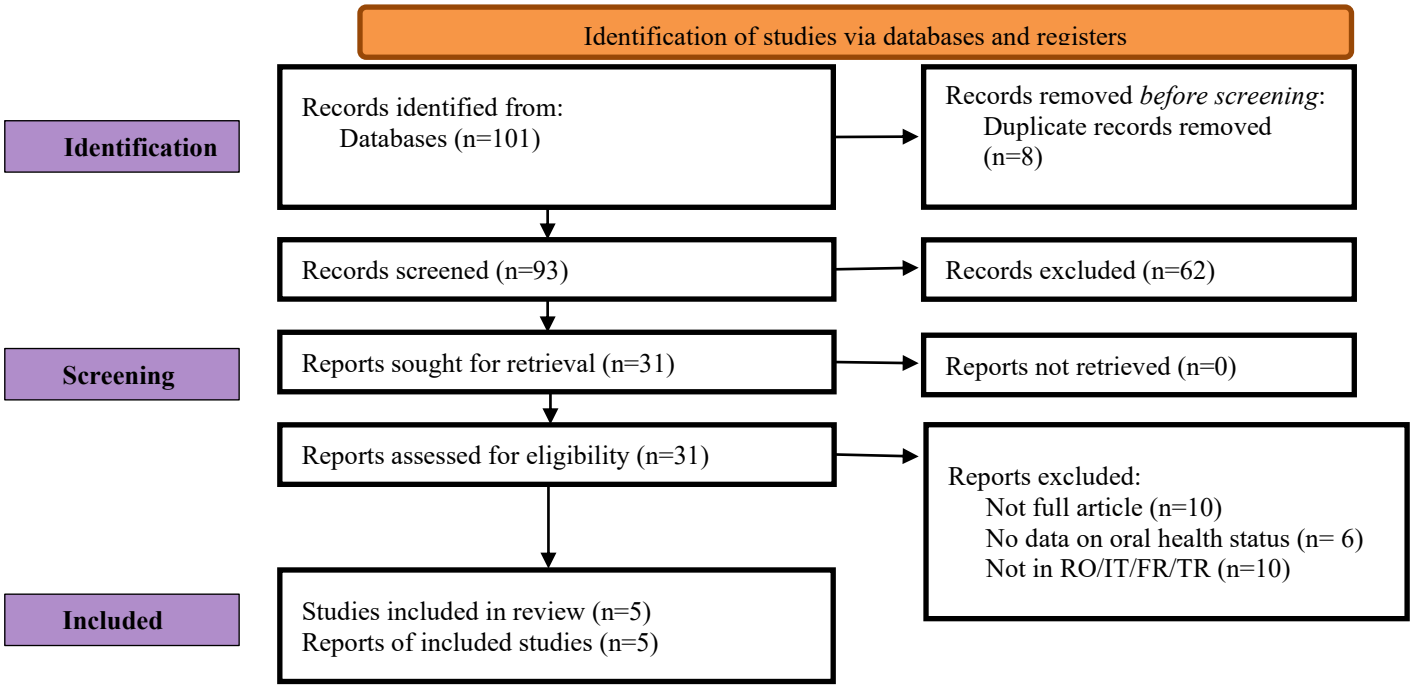

Figure 1. PRISMA outline [15]

RESULTS

1. Romania

We found 4 studies regarding the oral health status of SO athletes from Romania. Marks et al. [16] conducted a retrospective longitudinal study on the oral health of the SO athletes who participated in the annual SO held in different countries of Europe and Eurasia between 2007-2012. Gingivitis was reported for 70.41% of the Romanian participants [16].

According to SOSS standard screening rules, congestion or significant deviation from the normal contour or texture of free or attached gingival margins or papillae on three or more teeth within the same area (between the lower canines) was recorded as sign of gingival disease [11]. The other 3 studies published reported data from the Special Olympics Romania (SOR) National Games that took place in 2012 [14], 2016 [17] and 2018 [18] (Tab. I).

2. France

The only data on oral health of SOSS athletes in France were mentioned by Marks et at. [16] who reported that 49.52% of the examined athletes had signs of gingivitis.

3. Italy

We found 2 studies regarding the oral health status of ID athletes that had participated in the SOSS games held in Italy. According to Marks et al. [16], 62.2% of the Italian athletes examined during SO events had visible manifestations of gingivitis. The most recent study conducted by Fernández Rojas et al. [19] in 2021 on 1228 athletes with ID (mean age: 28.8-years-old) showed that 60.6% of the IT participants had signs of gingival inflammation while 9.4% had sealants.

4. Turkey

Although SOSS is active in TR since 2003, published data regarding the oral health of intellectual disabled athletes participating in the SO games are few. Marks et al. [16] reported signs of gingivitis in 66.29% of the athletes from Turkey that participated in the SO games during 2007-2012.

Table I. Comparative data regarding the oral health status of Romanian SO athletes

	Vinereanu et al. [14] (2012 SOR)	**Vinereanu et al. [17] (2016 SOR)**	**Vinereanu et al. [18] (2018 SOR)**
N	102	249	271
Mean age (years)	6 – 39 (17.80 [6.67])	6 – 44 (21.45 [8.82])	6 - 56 (19.34 [9.00])
Caries-free (%)	26.6	23.7	7.4
DMF-T [SD]	6.49 [6]	7.76 [6.79]	8.13 [5.69]
RI (%) [SD]	16.8 [33.17]	25.75 [37.02]	20.06 [32.89]
RI > 80%	12.8	17.2	11.2
RI < 10%	73.5	59	69.7
Sealants (%)	4.9	4.4	4.4
Gingivitis (%)	75.5	73.5	79
% subjects with at least 1 molar extracted	20.6	34.5	26.6

DISCUSSION

Analysing data on the oral health of SO athletes published during the last 12 years for the four countries of the OSCAR project, the present study compared available oral health indicators for SOSS athletes in the attempt to find potential differences and/or similarities. SOSS screenings in the participating countries are building up the world's largest database on oral health of people with ID. The use of the same validated screening protocol enables valid comparison between SO athletes in many countries where the program is implemented.

In order to place SO athletes from project countries within the bigger picture of SO athletes worldwide, comparison was subsequently extended to other countries for which available recent data was found. Data regarding the percentage of caries free athletes, RI and PI indexes and percentage of subjects with at least 1 molar extracted were only found for Romanian SOSS athletes. Data concerning caries-free athletes from the other OSCAR project countries could not be found. Paucity of this kind of data is probably due to the fact that the official SS screening template is oriented towards obtaining an overall image of the oral health situation of this category of population rather than towards gathering detailed individual data on the subject. Improvement and validation of an upgraded standard SS screening protocol could enable more reliable comparisons between SO athletes from various countries.

In Romania, the proportion of caries free athletes ranged, for various events and regions, between 7.4 and 26.6%, as we found in the studies of Vinereanu et al. [14,17,18]. The mentioned values are lower than those reported by Bissar et al. [20] and Pradhan et al. [21] for German and Australian SO athletes respectively (Tab. 2). Calculated values for DMF-T index for Romanian SO athletes varied from 6.49 to 8.13 [14,17,18], higher than those found by Bissar et al. [20] in German SO athletes (Tab. II).

The restorative index (RI = [F / (F + D) x100] %, where F = filled teeth and D = teeth with untreated decay) gives an image of the proportion to which treatment needs are actually met. Reported values for RI were found only for studies conducted in Romania, varying from 16.8 to 25.75 [14,17,18]. It is important to notice that

almost 2 out of 3 athletes have a RI under 10%, which means that many Romanian SO athletes have a high percentage of unmet dental needs.

Data regarding the presence of sealants on permanent teeth in SO athletes were found only for Romania and Italy. In Romania, the percentage of athletes with sealed permanent teeth was between 4% and 5% [14,17,18], while corresponding figures for Italy were almost double [19]. An older study on German SO athletes reported even lower values of sealants than those reported in Romania [20]. In other countries prevention seemed more present, as Pradhan et al. [21] identified sealants in about one quarter of the examined Australian SOSS athletes.

It is important to mention that for the SOSS events organised in Romania since 2018 professional cleanings and glass-ionomer sealants are provided, which significantly rose the proportion of subjects with sealants by event completion (up to 11%) [11].

Identification of gingivitis is part of the validated SS screening protocol, therefore data on the subject was available for all project countries. Differences exist between reported data regarding gingival signs for SO-SS athletes in the 4 OSCAR project countries. About 75-80% of the Romanian athletes had gingival inflammation signs [14,17,18], while in French athletes gingivitis was noticed in only 50% (Marks et al. [16]). In Turkey, 2 out of 3 athletes participating in the SO National Games had signs of gingivitis (Marks et al. [16]), value comparable with those obtained by Marks et al. [16] and Fernandez Rojas et al. [19] for

Table II. Other SOSS results from National SO Games events worldwide

Authors (year)	Subjects (n)	Age (mean age)	DMF-T	Caries free (%)	Signs of gingivitis (%)	Sealants (%)
Bissar et al. [20] (2010)	160 German SO athletes	12 – 17 (15.3)	2.3	41.9	-	2.5
Trihandini et al. [22] (2012)	1217 SO athletes from Indonesia	(13.46 ± 2.97)	-	-	29.8	-
Fernandez et al. [23] (2016)	503 SO athletes from Europe and Eurasia	(17.08 ± 2.2)	-	-	38.7	-
Tanboga et al. [24] (2016)	2740 Turkish SO athletes	14.46	-	-	62	1
Fernandez Rojas et al. [19] (2021)	334 Greek SO athletes	42.4	-	-	61.1	6.5
	758 Spanish SO athletes	43.3	-	-	66.1	5.2
	1228 Italian SO athletes	28.8	-	-	60.6	9.4
Pradhan et al. [21] (2021)	155 Australian SO athletes	(15)	-	40	59	23

Italian athletes. These results are consistent with those reported by other researchers in other parts of the world (Tab. II).

Al-Shamlan et al. [25] conducted a systematic review regarding the oral health status of ID athletes participating in worldwide SO events. They analysed 4090 published articles for terms and keywords (e.g. "oral health", "athletes", "intellectual disabilities" and "Special Olympics") of which only 9 met the inclusion criteria. The results indicated that athletes with ID have higher levels of oral problems compared to healthy athletes.

Signs of gingivitis were identified in at least 40% of the examined athletes. Prevalence of sealants among athletes with ID varied between 0 and 37.7%; presence of sealants was the less frequent oral feature reported. The same authors also found that athletes with ID in Europe, Eurasia, Middle East North Africa (MENA) and Latin America had higher prevalence of gingival disease than SO athletes from other regions of the world.

Regarding the oral health of SO athletes worldwide, two important aspects need to be pointed out: (1) data from SOSS screening events are not representative for the general population with ID, as SO athletes tend to be from the younger sector of this population, likely to be in better shape, more integrated in society and therefore with a better general and oral health status; (2) for a more detailed image of the oral health status of the SO athletes, an upgraded protocol could be considered, with more detailed data on caries experience (e.g. as to enable calculation of DMF-T index and it's components), gingival status (with PI), temporo-mandibular joint (TMJ) disorders and even orthodontic problems. This would enable more reliable comparisons between oral health status of this "privileged among the underprivileged" category of population and could help identify ways to improve by copying health systems that seem to be more efficient.

All of the mentioned studies reflect the need of more preventive strategies, access to dental treatment and regular dental check-ups for SO athletes in all of the OSCAR project countries. In this respect, increasing the availability of readily-available practical information on Special Oral Care for practitioners through means of trainings, courses and international projects such as Erasmus + project 2019-1-RO01-KA202-063820 Oral Special Care Academic Resources (***https://oscarpd.eu/***), could contribute to sharing experience and information and encourage the creation of more barrier-free dental offices.

CONCLUSIONS

1. SO athletes from the four analysed countries still have a lot of unmet dental treatment needs and few sealed permanent teeth.
2. Romanian ID athletes have poorer oral health status as compared to SO athletes from Italy, France, and Turkey.
3. An upgrade of the standand Special Smiles screening protocol could enable more reliable comparisons between SO athletes from various countries.
4. Need is felt for targeted preventive programs in order to decrease caries prevalence and gingival inflammation in this category of population
5. Educational programs for parents and caregivers are needed to raise awareness regarding the role of oral health within the greater picture of general health.
6. More dental professionals trained in Special Oral Care are needed in order to improve access of children/people with special healthcare needs to quality oral care.

Note: This research is part of 2019-1-RO01-KA202-063820 Erasmus+ Project "Oral Special Care Academic Resources" (OSCAR)

Conflict of interests: None

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